

# PROPERTY PLANNING COMMON ELEMENTS

## COMPONENTS OF MASTER PLANS

### HABITATS AND THEIR MANAGEMENT

#### Site Preparation

##### *Description*

Site preparation is the creation of a favorable growing environment for tree seeds or seedlings. The main objective is to establish plant communities of desired quantity (# trees/acre) and quality (species and form). Plants are affected by sunlight, relative humidity, foliage and soil temperatures, soil moisture, fertility, and bulk density, and animal and plant pests. Site preparation has the potential to address all of the plants' requirements, and influences which factors will ultimately affect survival and development. Site preparation must create sufficient numbers of suitable, well-spaced growing sites for the establishment and growth of tree seedlings without causing excessive soil disturbance. Site preparation should also be done in a manner which facilitates subsequent management and achieves results at the lowest cost.

Effective site preparation often will alter residual vegetation and slash load, expose mineral soil, increase root zone temperature, reduce the risk of frost damage, reduce competing vegetation, reduce the risk of insect damage, increase oxygen in the soil, and enhance nutrient availability. When site preparation is done incorrectly it can cause increased soil erosion and water quality degradation, increase soil compaction, create landslides, aggravate moisture problems, and negatively impact biodiversity and wildlife habitat (e.g., by facilitating the spread of non-native invasive plants).

When choosing a method of site preparation, stacking treatments can quickly become very expensive. Managers planning to do site preparation after a harvest should consider making the site preparation part of the logging activities. For example, the skidding of large trees can expose mineral soil and drop seed. Combining these activities can reduce total expense, but it does require increased planning, development of contract specifications and requirements to meet objectives, and an experienced labor force. It also may result in reduced timber sale revenue.

Site preparation techniques include manual, mechanical, chemical, prescribed fire, and cover cropping methods. Manual is rarely used as it is appropriate only for the smallest plantings or most difficult site. The other methods are described briefly below.

#### Mechanical

This method includes blading, raking, plowing, ripping, mixing, chopping, scalping, mounding, dragging, trenching, and rotovating.

- **Blading:** use of an angled blade to scarify soil prior to a harvest or clear a path through slash and small residual trees; best on boulder-free flat terrain and in frost-free conditions.
- **Raking:** removes brush and medium-heavy slash loads, and can be used on slopes.



- **Plowing:** use of a front-mounted V-plow; controls competing vegetation, removes slash, and exposes mineral soil; works on level to slightly rolling sites and is good with medium-heavy slash loads; wet sites or sites with large residual trees, shallow soils, and thin humus layers should be avoided.
- **Ripping:** hydraulic mounted tines with wings rip through soil, reducing bulk density; can be used to rehabilitate compacted skid trails, roads, and landings; should be done with the contours, and can be done when ground is frozen but not if soil is wet.
- **Mixing:** mechanical blending (e.g., disking) of mineral and organic soil layers; controls competing vegetation and exposes mineral soil, though does not mend compacted soil; provides an excellent growing environment for seedlings; generally works best in dry to lightly frozen soil; does not work on rocky sites or sites with residuals or stumps; can be expensive.
- **Chopping:** cutting or flattening of brush, shrubs, and small trees; best on even terrain with loamy or sandy soils that are not wet or thin; limited on sites with large residual trees or stumps or where large rocks/exposed bedrock are present.
- **Scalping:** also called patch scarification; creation of intermittent patches of exposed soil for tree planting or seeding; works well on dry sites with thin humus layers; wet sites should be avoided; scalping is preferable in late summer or early fall preceding planting to allow scalp to stabilize over the winter.
- **Mounding:** production of intermittent raised mounds with deeper pits and higher mounds than scalping; make good planting sites in cold, moist environments or on soils with thick organic matter.
- **Dragging:** dragging of chains or drums across a site to control brush, expose mineral soil (if organic layer is not too thick), and crush older slash; works on flat to rolling terrain; not limited by rocks or soil depth; often used with raking.
- **Trenching:** produces continuous trenches of exposed mineral soil with multiple planting sites along the wall of the trench; works best on dry to medium sites; heavy or rocky soils and heavy slash should be avoided.
- **Rotovating:** produces a continuous band of tilled soil; generally used on old agricultural sites; ideally should be done in the fall prior to spring planting to allow soil to settle; sites with heavy, rock, or wet soils or areas of slash should be avoided.

## Chemical

The use of chemicals in site preparation does not alter the slash load or expose mineral soil the way mechanical site preparation does, but it can be an effective means to control competing vegetation and improve tree growth. The use of herbicides for weed removal will increase the amounts of sun and water available to seedlings, and stimulate growth by increasing foliar and root zone temperatures. Herbicides will also kill plants that may be providing shelter for seedling-feeding pests, thereby reducing tree mortality and disease. Chemical methods may involve simpler equipment, be less expensive, and provide longer control than mechanical site preparation. However, care should be taken to select a product, application method, and time of year appropriate to the intended use, and to avoid exposing non-target species to chemicals. Chemical applications may need to be repeated for several years to ensure stand establishment.

DNR managers will follow all applicable policies, procedures, and Best Management Practices (BMPs) for using pesticides on DNR lands.



## Prescribed Fire

Prescribed fire can be an effective way to aid artificial or natural regeneration, particularly for fire-adapted cover types such as oak and jack pine, because it accomplishes multiple objectives. Prescribed burning: prepares a suitable seedbed by reducing organic layers; removes or reduces competing vegetation; facilitates access for planters by removing slash; creates plantable microsites; facilitates access for secondary site preparation; temporarily positively affects the soil nutrient regime through increased levels of cations and accelerated mineralization rates; and improves soil temperature through altered surface albedo and reduction in the insulating organic layers. Burning prior to planting has also been shown to positively affect ectomycorrhizal development and seedling health and survival.

Prescribed burning requires extensive training to plan, implement, and control and may be inappropriate or detrimental in areas where fire has never played a natural role.

## Cover Crops

Cover crops are appropriate for former agricultural sites (oldfields, pastures, row-crop fields) that are being reforested or converted to forest. Cover crops can be used to replace or build soil organic matter levels and increase soil aggregation, structure, and water-holding capacity. They can aid in soil-stabilization, reclaim nutrients that have moved to lower soil levels, reduce leaching losses, and break up hard pans when their roots penetrate these layers. Cover crops also prevent invasion by competing vegetation and provide erosion control and additional wildlife habitat. They may also aid in breaking insect and disease cycles.

When selecting a cover crop, choose a species that will not adversely affect the growth and development of trees. Grasses can compete fiercely with trees. Legumes on the other hand have a number of advantages that can benefit seedlings. Legumes add nitrogen to the soil, increasing the fertility level, conserving moisture and nutrients, improving the soil's physical condition, building up the soil organic matter, enhancing microbial activity, decreasing erosion, and providing a mulching effect. Most legumes have shallow roots that are not as finely branched as grasses, making them less able to compete with tree roots for water and nutrients. Small grain crops such as winter wheat, rye, and oats can be useful cover crops. Generally, these grain crops can be planted in directly with seedlings. On erosion-prone sites, herbaceous legumes have been seeded in to reduce weed competition and bolster soil nitrogen.

